

AMENDMENTS TO THE DRAWINGS

Enclosed please find a set of formal drawings, including replacement sheets for Figs. 1-3. The previously approved correction of reference numeral "20" (first appearance) to "21" has been incorporated into Fig. 2. Additionally, reference numeral "22" previously in Fig. 1 has been corrected to "21." Reference numeral "36" has been added to Fig. 3.

REMARKS

Applicants' attorney thanks the Examiner for her comments. Independent Claims 1, 14 and 20 have been amended to recite the presence of at least twenty inlet channels in the first end chamber. This amendment is supported on page 13, lines 12-13 (disclosing at least about twenty of the channels) and in the Examples (disclosing thirty-six of the inlet channels). As explained on pages 10-11 and 13 of the specification, the large number of inlet channels minimizes the angular flow of fluid within the first end chamber. Angular fluid flow, when present in the first end chamber, undesirably increases fluid pressure and reduces the volume of fluid delivered by a typical constant-pressure fluid pump.

Amended Claims 1, 14 and 20 make it clear that the first end chamber delivers inlet fluid to the annulus using the inlet fluid channels. This is further explained on pages 10-11 of the specification, with reference to the drawings. Amended Claims 1, 14 and 20 further recite that the passage extends through a center of the thermal transfer roller and to the first end chamber. This is explained on page 10, with reference to Fig. 2. Various dependent claims have been amended for consistency with the amended independent claims.

Independent Claim 20 has been amended to recite a "roller assembly," thereby providing antecedent basis for dependent Claims 21-24. Claim 25 has been canceled.

a) Interview Summary

Applicants' attorney thanks Examiner Ciric for the courtesy of the telephone interview on 13 July 2005. Based on the interview, Applicants believe that all of the formal objections have been overcome. As discussed in the interview, Claim 20 now recites a "roller assembly" in order to provide antecedent basis for this term in dependent Claims 21-24. Also, a brief discussion of amendments to the drawings has been added to this response.

Based on the interview, Applicants understand that the amended claims overcome the rejections based on the prior art of record. For instance, each independent claim recites "at least twenty" inlet channels in the first end chamber, and each claim requires a passage extending through a center of the thermal transfer roller. The Examiner

will perform another prior art search before making a final decision on the claims. If any issues arise, the parties will attempt to resolve them by telephone.

b) Objection To The Drawings

The Examiner objected to the drawings based on various informalities. Applicants enclose herewith a set of formal drawings, Figs. 1-3, including the corrections required by the Examiner.

The Examiner previously approved a correction of reference numeral "20" (first appearance) to "21" in Fig. 2. This change has been incorporated in the formal drawings. Additionally, reference numeral "22" previously in Fig. 1 has been corrected to "21." Reference numeral "36" has been added to Fig. 3.

Applicants believe the drawings are now in suitable form, and request that the objection be withdrawn.

c) Objection To The Specification

The Examiner objected to the specification based on the references to "an inlet end of the thermal transfer roller" and "an outlet end of the thermal transfer roller." The specification has been amended at page 10, line 10 to remove the terminology objected to. The specification now refers to "a first end 21" and "a second end 22" of the annulus and thermal transfer roller. Applicants request that this objection be withdrawn.

d) Objections To The Claims

The Examiner objected to Claims 22-25 under 37 C.F.R. §1.75(c) as failing to further limit the subject matter of a previous claim. This objection is respectfully traversed in view of the foregoing amendment.

Claim 22 depends from Claim 20, and further requires the roller assembly to include a second roller. Thus, Claim 22 is narrower than Claim 20.

Claim 23 depends from Claim 20, and requires the roller assembly to include at least two thermal transfer rollers, each meeting the limitations of the thermal transfer roller described in Claim 20. Thus, Claim 23 is narrower than Claim 20.

Claim 24 depends from Claim 21, and further requires the roller assembly to include a second roller. Thus, Claim 24 is narrower than Claim 21. Claim 25 has been canceled.

In summary, each of Claims 22-24 is narrower, and not broader than the respective claim from which it depends. Applicants request that this objection be withdrawn.

The Examiner objected to Claims 1-13 based on the use of “at least an inlet chamber” in Claim 1. Claim 1 is amended to recite a first end chamber (which includes the inlet channels) directing fluid to the annulus, and a second end chamber directing fluid away from the annulus. Also, the numbers in the dependent claims have been written in grammatical form, per the Examiner’s request, except that Claims 5 and 6 have been canceled. Applicants request that this objection be withdrawn.

e) Claim Rejections Based On 35 U.S.C. §112

The rejection of Claims 1-25 under 35 U.S.C. §112, second paragraph, is respectfully traversed. The amended claims overcome all of the objections. None of the amended claims refers to “an inlet end of the thermal transfer roller” or “an outlet end of the thermal transfer roller.” Also, the claims reciting numbers of inlet or outlet channels express the numbers in grammatical form (e.g. “ten,” “twenty” or “thirty”). The phrases referring to “a plane which includes the circumference of the inlet end chamber” have been removed from the independent claims. The terms “about” have been removed from the dependent claims.

Furthermore, phrases such as “inlet end chamber” and “outlet end chamber” have been replaced with “first end chamber” and “second end chamber,” respectively. The first end chamber is the inlet chamber located at the first end of the thermal transfer roller and the annulus. The second end chamber is the outlet chamber located at the second end of the thermal transfer roller and the annulus. See pages 10-11 of the specification.

Applicants believe that the amended claims are clear, and request withdrawal of the 35 U.S.C. §112 rejection.

f) Claim Rejections Based On 35 U.S.C. §102(b)

The rejection of Claims 1, 3, 4, 13, 20 and 22 under 35 U.S.C. §102(b) as anticipated by U.S. Patent 4,351,386 (Köbler) is respectfully traversed.

Köbler discloses a thermal transfer roller having first and second end chambers in communication with an annulus, and including guide vanes 22 defining a plurality of channels (Figs. 1 and 2). However, the guide vanes 22 are provided only in the second (outlet) end chamber, and define only outlet channels from the annulus (Col. 3, lines 9-16). The reference does not disclose a first (inlet) end chamber having progressively widening inlet channels as required by Claims 1, 14 and 20.

Furthermore, the outlet end chamber of Köbler includes only six of the outlet channels (Fig. 2). Köbler does not disclose an end chamber including at least twenty inlet channels as required by Claims 1, 14 and 20.

As noted in Applicants' specification, if the inlet channels in the first end chamber are too few in number, then angular flow of fluid within the channels may occur to an undesirable degree (page 13, lines 13-15). The number of channels should be high enough to substantially prevent angular or spiral flow of heat transfer fluid in the end chamber (page 13, lines 9-11). To this end, the minimum number of inlet channels required by Claims 1, 14 and 20 is more than three times the number of outlet channels disclosed in Köbler, and is twenty times the number of inlet channels disclosed in Köbler. Köbler, in Fig. 1, shows only a single inlet channel which is not divided.

The rejection of Claims 1-4, 8-9, 13-14 and 18-21 under 35 U.S.C. §103(a) as obvious over U.S. Patent 5,292,298 (Scannell) is respectfully traversed. Scannell discloses a thermal transfer roller having one or more channels in each of a first (inlet) end chamber and a second (outlet) end chamber (Abstract). The number of channels per end chamber may be as high as six, as shown in the drawings. A key objective of Scannell is to increase pressure inside the channels by constricting flow, so that a cleaning solution can be used to descale the channels without requiring disassembly of the apparatus (Col. 2, lines 11-15, Col. 3, lines 21-32). To this end, regardless of how the channels are otherwise configured, each one is provided with a small exit opening that can be readily capped or plugged to maximize pressure inside the channel (Col. 6, lines 5-68).

Contrary to Applicants' Claims 1, 14 and 20, Scannell does not disclose an end chamber which includes at least twenty inlet channels. Furthermore, Scannell does not attempt to reduce fluid pressure by providing a large number of inlet channels which minimize angular flow of fluid. Every embodiment of Scannell is directed to increasing fluid pressure to facilitate in-line cleaning. A large number of channels as required by Applicants' claims, would diminish or defeat the objectives of Scannell.

For at least these reasons, the claim rejections under 35 U.S.C. §102(b) should be withdrawn.

g) Claim Rejections Based On 35 U.S.C. §103(a)

The rejections of Claims 5-7 and 23 under 35 U.S.C. §103(a) as obvious over either of Köbler or Scannell are respectfully traversed. Claims 5 and 6 have been canceled, and the limitations of former Claim 6 have been added to the independent claims. Therefore, this rejection will be addressed as to the independent claims.

Independent Claims 1, 14 and 20 each require at least twenty inlet channels in the first (inlet) end chamber. The purpose of this limitation (reflecting former Claim 6) is to provide enough channels to substantially prevent angular or spiral flow of heat transfer fluid in the first end chamber (page 13, lines 9-15). If the channels are too few in number, then angular flow will not be substantially prevented.

Angular flow patterns in the end chambers (especially the first, inlet end chamber) cause increased fluid pressure and reduce the volume of fluid delivered by a constant-pressure fluid pump. By substantially preventing angular flow, the drop in fluid volume, and the consequent drop in heat transfer, are minimized (page 11, line 13 — page 12, line 4).

As explained above, Köbler does not disclose more than one inlet channel in the first (inlet) end chamber, and does not disclose more than six outlet channels in the second (outlet) end chamber. Accordingly, Köbler does not substantially prevent angular fluid flow in either of the end chambers, and does not reduce angular flow at all in the first (inlet) end chamber. Furthermore, it would not have been obvious to modify Köbler to dramatically increase the number of inlet fluid channels, to a minimum of twenty, as required by Claims 1, 14 and 20.

Scannell discloses first and second end chambers having up to six channels (See Abstract and drawings). As explained above, a key objective of Scannell is to provide increased fluid pressure in the channels to facilitate in-line descaling using a cleaning solution. Accordingly, it would not have been obvious to dramatically increase the number of inlet fluid channels, to a minimum of twenty, because to do so would substantially reduce the fluid pressure resulting from angular flow.

For at least these reasons, the claim rejections under 35 U.S.C. §103(a) should be withdrawn.

h) Conclusion

Applicants believe that this patent application is in condition for allowance. If the Examiner detects any unresolved issues, then Applicants' attorney respectfully requests a telephone call from the Examiner.

Respectfully submitted,



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